

# Genetic Genealogy Information

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## What is your purpose of a genealogical DNA test?

Verify existing research?

Prove or disprove suspected relationships?

Discover living relatives?

DNA is one part of the evidence used in genealogy. Traditional genealogy must be used in conjunction with DNA to establish a genealogical conclusion.

## Types of genealogical DNA tests:

**Mitochondrial DNA (mtDNA)** tests either a male or female along their direct maternal line. mtDNA mutates extremely slowly and can be passed down virtually unchanged for thousands of years, your mtDNA may be identical to that of your very distant direct maternal ancestors. For this reason, it is often impossible to find the genealogical link to your matches. mtDNA is recommended for target testing for specific questions on the maternal line.

**Y-Chromosome (Y-DNA)** tests a male along his direct paternal line. The Y-DNA mutates only very slowly and therefore can be useful for genetic genealogy. This test works best for questions on the surname line.

mtDNA and Y-DNA tests are available from



**Autosomal (atDNA)** tests a male or female for all ancestors. Humans have 22 pairs of autosomes and one pair of sex chromosomes (X and Y). One of each autosome is inherited from each parent. The atDNA tests provide information on the 22 autosomes and the X. These tests are the most popular and least expensive option for genetic genealogy. Available from these four main companies which all will provide a list of relative matches as well as ethnicity estimates.



	<i>23andMe</i>	<i>AncestryDNA</i>	<i>FamilyTreeDNA</i>	<i>MyHeritageDNA</i>
cost	\$99	\$99	\$79	\$69
database	12,200,000	21,000,000	1,770,000	5,600,000

*database size source: ISOGG Wiki updated 28 March 2022*

23andMe and AncestryDNA require that you take their test to get their results.

FamilyTreeDNA and MyHeritage allow an upload of raw DNA from the other companies. Partial results are free at FTDNA and MyHeritage, full results are \$19 at FTDNA and \$29 at MyHeritage. 23andMe. MyHeritage will include health information at a higher cost.

## Ethnicity Estimates

Ethnicity estimates offer information on biogeographical ancestry. In an attempt to measure an individual's mixed geographic heritage, the DNA tests identify particular markers that are associated in areas where they occur in indigenous populations. These ethnicity estimates are the least accurate part of the DNA test and should be viewed as accurate only to a continental level.

AncestryDNA provides information on migration patterns of your ancestors via your "DNA Story" where your ethnicity estimate is broken into percentages in any of 26 regions or further into communities or migrations. Regions are where your ancestors lived thousands of years ago. Communities and Migrations are regions your ancestors lived within the last few hundred years.

If you are not included in a migration or community, it does not mean that you do not have that ancestry. It only means that at this time, your DNA does not meet the criteria for that particular group. 23andMe provides similar suggested Recent Ancestor Locations from in a more recent time period.

## Matches

Since your long dead ancestors did not take a DNA test, what you are trying to find are relatives who did take the DNA test. The DNA you share came from your common ancestor or ancestors. This evidence may help verify your relationship.

The test works by identifying linked DNA segments along the chromosomes. These linked DNA segments are then compared to other individuals. If two or more individuals share the same linked DNA segment, then they are declared a "match". A match means in DNA is that you have a common ancestor.

Autosomal DNA recombines each generation. Therefore, the number of markers shared with a specific ancestor decreases by half each generation. Every generation has about 50% less in common. These are estimates, because while you get 50% from each parent, you don't necessarily get an even amount from grandparents and so on.

Distant matches who share very little DNA, can be false positives. The more distant the relationship, the more difficult it is to pin point the exact relationship without a good paper trail.

The DNA testing companies give you information on how much DNA you share with your match (relative). It is up to you to figure out the exact relationship since many relationships will share the same amount of DNA. It is better to use the chart rather than rely on any predictions made by the testing company. You will need to understand different relationships, like first cousin once removed vs. second cousin as they share different amounts of DNA.

The **X chromosome** does not get inherited the same way as your autosomal chromosomes. A female gets one X from her father, and one X from her mother. A male only gets one X chromosome, since he gets a Y from his father, he only gets an X from his mother. This can help narrow down who that Most Recent Common Ancestor (MRCA) is. This information is not provided by AncestryDNA. Uploading AncestryDNA data to another site will show X data.

**All chart numbers are estimates. Relationships beyond 2nd cousins will vary.**

<b>Relationship Predictions</b>		<b>Range cM</b>	<b>Mean cM</b>	<b>Range %</b>	<b>Mean %</b>
Parent/Child			3600	50	50
Siblings		2300 - 3900		32 - 54	*50
Grandparent Grandchild Half Sibling	Uncle Aunt Nibling	1300 - 2300	1800	18 - 32	25
1C Half Uncle Grand Aunt	1G Grand Half Nibling	575 - 1330	900	8 - 18.5	12.5
1C 1R	2G Grand	215 - 650	437	3 - 9	6.3
2C	1C 2R	75 - 360	218	1 - 5	3.1
2C 1R	Half 2C	30 - 213	109	.4 - 3	1.6
3C	2C 2R	0 - 109	55	0 - 1.5	.8
3C 1R	Half 2C 2R	0 - 75	27	0 - 1	.4
4C		0 - 50	14	0 - .7	.2

*G = Great      Grand = Grandparent      C= Cousin      R=Removed*

*10% of 3rd cousins, 50% of 4th cousins will not share any measurable DNA.*

*\*Siblings will share ~50% DNA at 23andMe, ~2590 everywhere else.*

*4th and more distant cousin relationships become difficult to distinguish without a family tree.*



reports by percent %. The DNA comparison tool will give amount of cM.



report by amount of shared cM and %.



reports by shared cM. To Convert to %, divide by 68.

**Shared cM project** at <https://dnainter.com/tools/sharedcmv4>

This tool predicts relationships based on crowd sourced information of known relationships and amounts of shared DNA. Input the amount of shared DNA in cM and relationship probabilities are given.

## Websites:

**International Society of Genetic Genealogy (ISOGG)** at <https://isogg.org/> includes a wiki and may resources on genetic genealogy.

**DNA Central** at <https://dna-central.com/> a subscription site with genetic genealogy resources

**Facebook Groups:** always use caution with advice from social media, but there are some good discussions on the latest in DNA and sometimes input from experts. These are some of the groups that include the professionals in the field.

**DNA Detectives** has many members searching for biological family.  
<https://www.facebook.com/groups/DNADetectives/>

**ISOGG** <https://www.facebook.com/groups/isogg/>

**Genetic Genealogy Tips & Techniques**  
<https://www.facebook.com/groups/geneticgenealogytipsandtechniques/>

## Books:

**Genetic Genealogy in Practice** by Blaine T. Bettinger and Debbie Parker Wayne

**The Family Tree Guide to DNA Testing and Genetic Genealogy** by Blaine T. Bettinger

## *Upload Options For Your Autosomal DNA*

**FamilyTreeDNA** allows uploads from 23andMe, AncestryDNA, or MyHeritage. This is free, however to get your complete results, there is a \$19 charge.

**MyHeritageDNA** allows uploads from 23andMe, AncestryDNA, or MyHeritage. This is free, however to get your complete results, there is a \$29 charge.

**LivingDNA** is offering free uploads to their One Tree One World project.

**GEDmatch** is a very popular place to upload DNA. There are many tools for comparing any other GEDmatch user to yourself or other kits you manage. Most of the tools are free. They offer a few extra premium tools for a \$10 contribution per month.

**Promethease** provides a report based on your DNA genotypes connecting to scientific information cited in SNpedia. The lengthy report includes a lot of information about carrier status and potential health risks. There is a cost of \$5 to \$10.